BUCKEYE ENVIRONMENTAL NETWORK

Comments on the Draft Division of Air Pollution (DAP) Control Permit-to-Install and Operate

for

SOBE Thermal Energy Systems, LLC (Facility ID: 0250110024; Permit Number: P0132799)

by

Dr. Ranajit (Ron) Sahu, Consultant

These comments are submitted on behalf of the following Ohio organizations

Buckeye Environmental Network, SOBE Concerned Citizens, Ohio NAACP, Black Appalachian Coalition, Black Environmental Leaders, *Black Environmental Leaders Action Fund, People Over Petro Coalition, Between the Waters, Ashtabula County Water Watch, Ohio Brine Task Force, Coshocton Environmental and Community Awareness, Fresh Water Accountability Project, Radioactive Waste Alert, Citizen Pollution Watch, Athens County Future Action Network, Concerned Citizens of Lake Township, Sustainable Medina County, Network for Oil and Gas Accountability and Protection, Columbus Community Bill of Rights Coalition, Ohio Community Rights Network.*

The proposed permit for this facility should not be granted as currently proposed because there are significant technical deficiencies, some of which are discussed in these comments. We ask that the Ohio Environmental Protection DAP fully respond to and resolve these deficiencies and re-propose the draft permit for additional public comments before making a final decision.

By way of context, SOBE Thermal Energy Systems, LLC proposes to install a 13.72 MMBtu/hr Thermolyzer® (a type of pyrolysis unit (P001) that will extract syngas from tire derived chips (TDC) to power existing natural gas boilers (B006 and B007). The boilers provide steam for various buildings in downtown Youngstown, and will burn the syngas along with natural gas. The pyrolysis unit is equipped with two gas cleaning units (GCU) and a 1.09 MMBtu/hr flare.

Comment 1 - We have relied on the documents provided in the record in developing these comments. As a starting matter, we note that critical technical documents relied upon by the applicant for developing the emissions from this facility are not available in the public record. We note these later. It is not clear to us how the agency could have conducted its technical review without having such documents.

Comment 2 - The record describes the flare as being "enclosed" but there are no drawings or technical specifications that confirm any details about this enclosed flare.

Comment 3 - We also note that other documents in the record indicate different heat inputs for the Thermolyzer. Therefore, the basis for the 13.72 MMBtu/hr Thermolyzer is not clear.

Comment 4 – The emissions estimates provided for the facility are simply unsupported or very poorly supported.

A memorandum from Optics Consulting dated September 12, 2022 states that the technology to be used "…gasifies tires through a modified pyrolysis process." However, what "modified pyrolysis" means is never discussed or defined.

Further, this memo makes the following completely unsupported statement: "[T]he process produces a clean gas that does not produce any hazardous air pollutants as classified by the U.S. EPA." The memo provides the following gas composition table.

Gas Composition

The composition of the gas produced from the Thermolyzer™ system is:

Chemical Symbol	Gas Constituent	% By Volume
CH_4	Methane	47.25
H_2	Hydrogen	30.8
C_2H_4	Ethylene	8.5
CO_2	Carbon Dioxide	5.0
CO	Carbon Monoxide	3.1
C_2H_6	Ethane	3.0
C_3H_6	Propene	1.6
C_3H_8	Propane	0.12
C8H18	Octane	0.63
Total		100

We note that pollutant concentrations are often in the ppm or tens/hundreds of ppm and these are often significant given the toxicity of most air toxic compounds. The composition table does not analyze the presence of gases at these concentrations. Therefore, it is premature to conclude that no air toxics are present.

Even if it were the case that no air toxics are present in the syn gas from the Thermolyzer, combusting this gas in the boilers or the flare will produce a range of products of incomplete combustion, that, unavoidably contain numerous air toxics. Thus, whether or not air toxics are present in the syn gas, they will be emitted to the atmosphere.

We have carefully reviewed the emissions spreadsheet ("SOBE Potential Emissions Spreadsheet") for the facility and note the following:

4A - Thermolyzer

In the Tab: Thermolyzer in the emissions spreadsheet, the following emission factors are provided.

Thermolyzer Emissions Factors		
	Nat Gas (lbs./MMBTU)	Syn Gas (lbs./MMBTU)
NOx	0.098	0.21
PM10	0.005	0.0154
PM2.5	0.005	0.01463
CO	0.0824	0.0449
VOC	0.0029	0.0036
SO2	0.0014	0.0048
CO2	117	131.7

The Optics Consulting memo states that these emission factors were developed by TRC Environmental Corporation. We have carefully reviewed the TRC report dated October 2020. We do not find the support for these emission factors in that report.

First, we note that the TRC report contemplates a phased project, and states that "[I]n Phase 2, two additional Thermolyzers will be installed." It is not clear therefore if this draft permit is just for the initial phase of this project, with a later phase yet to come. If so, this phasing raises significant concerns. All phases of the project should be analyzed and permitted.

Second, the TRC report states that "[E]ach Thermolyzer's rated heat input will be 62.2 mmBtu/hr." This is significantly greater than the 13.72 MMBtu/hr size noted in the draft permit. It is not clear therefore if the TRC report addresses the same Thermolyzer as the one proposed in the permit. Until this size difference is explained, relying on the TRC report, as the Optics Consulting memo does, does not make any sense.

Third, with regards to the composition of the syngas, the TRC report states that:

> "Table 1 presents the composition of six syngas samples collected from a CHZ Technologies Thermolyzer test facility in May 2017, which is described in Reference 1. The feedstock during the test was tires shredded to a size of one inch or smaller. Table 2 presents the concentrations of impurities measured in a syngas sample collected during the May 2017 testing.
>
> Table 3 presents the projected syngas composition when the Thermolyzer uses shredded tires as feedstock. These data were obtained from Reference 2, which also provides emission estimates for the Victory boilers when firing natural gas and syngas. Table 4 presents calculations of the higher heating value (HHV) of the projected syngas along with the carbon dioxide (CO2) emission factor."

However, crucially the document noted as Reference 2 (*Youngstown Thermal Summary of Existing Potential to Emit and Potential to Emit with New Boilers and Thermolyzer*, Memo by D. Ferro and M. Conway, September 21, 2020) in the TRC report is not available in the record. As a result there is no way to evaluate or determine the appropriateness of the TRC report's Table 3 emission factors in the TRC report, which are then used to support emissions the emission calculations for the facility. We note that the data from Reference 1 in the TRC report used tire sizes that are different ("one inch or smaller") than those contemplated in the facility ("Two Inch Chunks").

As such none of the data in the TRC report can be used as support for the emission calculations.

Fourth, the TRC report states, citing to other documents but no data, with regards to NOx emissions that:

> ""Refinery fuel gas firing generally yields higher thermal NOx formation than natural gas firing due to the higher flame temperatures caused by the higher hydrogen content of the refinery fuel gas." It is reasonable to assumed that Thermolyzer-produced syngas combustion will resemble refinery process gas combustion and result in similar emissions. Therefore, this report will use criteria pollutant emissions factors for refinery fuel gas combustion to estimate criteria pollutant emissions for syngas combustion."

The TRC report's discussion is highly speculative. It does not compare the hydrogen levels from syngas (which itself are unsupported) with typical hydrogen levels in refinery fuel gas – whose hydrogen content can vary significantly. Nor does the TRC report compare the presence of nitrogen species in either syngas or refinery fuel gas. In fact, for NOx, the document cited by TRC itself states that: "[*T]hese estimates indicate that uncontrolled NOx emission rates range from 0.150 to 0.210 lb/MMBtu for high-hydrogen content refinery gas firing; data were not available to verify this range." (italics in original, emphasis added).*

The lack of support for the NOx emission factor is evident. And, since this is the entire basis of TRC's statement that Thermolyzer gas "will resemble" refinery process gas, the entire "resemblance" is breathtakingly unsupported.

Therefore, the further discussion of refinery fuel gas as the basis for emissions from burning Thermolyzer syn gas is similarly speculative and unsupported. Since this is the entire basis for the emissions calculations provided in the record, they cannot be relied upon.

Fifth, with regards to some of the other emission factors, the TRC report relies on emission factors for the external combustion of refinery process gas in an industrial boiler. But since the "resemblance" of syngas to refinery process gas is speculative and unsupported, the reliance of this equivalence for the other emission factors (for PM, CO, and VOCs) are similarly improper.

Sixth, we note that the emissions spreadsheet, in the Thermolyzer tab states that PM2.5 is estimated as 95% of PM10 emissions. The basis for this is not provided.

4B - Boilers

In the Tab: Boilers, the following emission factors are provided when the boilers fire syn gas from the Thermolyzer.

Boiler Emissions on Syn Gas (From Victory Boiler)		
NOx	0.07	lb/mmbtu
PM10	0.0099	lb/mmbtu
PM2.5	0.006	lb/mmbtu
CO	0.037	lb/mmbtu
VOC	0	lb/mmbtu
SO2	0	lb/mmbtu
CO2	131.7	lb/mmbtu

The Optics Consulting memo states that these were provided by the boiler vendor, Victory Energy. However, no supporting documents from the boiler vendor are provided. Nor is there any discussion of how the boiler vendor could have arrived at these emission factors even though the notes in this Tab indicate that they are used to estimate worst case emissions from the boilers.

4C - Flare

In the Tab: Flare Stack, the following emissions factors are noted for both natural gas and for syn gas.

Flare Stack Emissions Factors		
	Nat Gas (lbs./MMBTU)	Syn Gas (lbs./MMBTU)
NOx	0.098	0.21
PM10	0.005	0.0154
PM2.5	0.005	0.01463
CO	0.0824	0.0449
VOC	0.0029	0.0036
SO2	0.0014	0.0048
CO2	117	131.7

The basis for these emission factors is simply not provided.

Therefore, collectively, the entire set of emissions estimates for the facility relies on unsupported or poorly supported emission estimates. There is no reason to therefore rely on such emissions estimates.

Comment 5 – The draft permit notes that "…Non-passenger TDC shall make up no more than 10% of the feed stock that is loaded to the reactors." It is not clear how this condition will be verified or enforced.

Comment 6 – The draft permit also states that "…A flow indicator that provides a record of vent stream flow diverted from being routed to the flare at least once every 15 minutes: (a.) The flow indicator shall be installed at the entrance to any bypass line that could divert the vent stream from being routed to the flare, resulting in its emission to the atmosphere."

It is clear therefore that the flare can be bypassed. However, none of the emissions calculations contemplate this possibility and it is assumed that no gases will bypass the flare. Clearly, since

bypass can occur, and is not included in the emissions calculations, the emissions calculations are deficient and underestimate the actual emissions that might occur.

Comment 7 – The testing condition in the draft permit does not require any testing or verification of the numerous air toxic compounds that will invariably be emitted from the flare. Therefore the permit is deficient with regards to testing.

Comment 8 – The Optics Consulting memo notes that it conducted dispersion modeling to determine the stack height needed to keep ambient concentrations below the national ambient air quality standards and that "[M]odeling indicates that 100-foot stacks are required for the boilers and Thermolyzer." The summary of the modeling is shown below.

NOx Modeling		
	100 Foot Stack (Emissions in ug/m3)	
Boiler 1 (.07)	31.96	
Boiler 2(.07)	31.96	
Future Boiler 3(.07)	31.96	
Therm (.21)	17.9	
50' Flare (.21)		21.22
Total	**113.78**	

Requirement is less than 188 micrograms per square meter

First, the highlighted "requirement" below the table refers to the NOx requirement as 188 micrograms per square meter. The units of measurement for this requirement, an air concentration, are not micrograms per square meter but micrograms per cubic meter.

Second, setting aside this apparent typographical error, the sum of the predicted NOx is substantially below 188 micrograms per cubic meter. The Optics Consulting memo does not describe the necessity of the 100-foot-tall boiler and Thermolyzer stacks.

The following Ohio organizations submit these comments and request the agency deny the permit. The community has been the sacrifice for far too long; it is time to end the assault on this environmental justice community.

Buckeye Environmental Network
Teresa Mills

SOBE Concerned Citizens
Lynn Anderson

Ohio NAACP
Annette McCoy

Black Appalachian Coalition (BLAC)
Archbishop Marcia Dinkins (founder)

Black Environmental Leaders (BEL)
Mark Gavin Sr & Dion Mensah

Black Environmental Leaders Action Fund (BEL AF)
Mark Gavin Sr & Dion Mensah

People Over Petro Coalition (POPCO)
Cheryl Johncox

Between the Waters
Dr. Peggy Ann Berry

Ashtabula County Water Watch
Mardy Townsend

Ohio Brine Task Force
Roxanne Groff

Coshocton Environmental and Community Awareness
Nick Teti

Fresh Water Accountability Project
Leatra Harper

Concerned Citizens of Lake Township/IEL superfund site
Chris Borello

Radioactive Waste Alert
Carolyn Harding

Citizen Pollution Watch
Jenny Morgan

Athens County Future Action Network
Heather Cantino

Sustainable Medina County
Kathie Jones

Network for Oil and Gas Accountability and Protection
Vanessa Pesec

Columbus Community Bill of Rights Coalition
Bill Lyons

Ohio Community Rights Network
Susie Beiersdorfer